REMARKS

The Examiner is thanked for the due consideration given the application. This Amendment has been filed concurrent with a Request for Continued Examination.

Claims 1-27 are pending in the applications. Claim 1 has been amended to generally include subject matter canceled from claims 2 and 17. Claims 13 and 20 have been amended to improve the language in a non-narrowing fashion.

No new matter is believed to be added to the application by this amendment.

Rejection Over PFEIFER et al. and KOGA

Claims 1-27 have been rejected under 35 USC §103(a) as being unpatentable over PFEIFER et al. (U.S. Patent 5,929,597) in view of KOGA (U.S. Patent 6,268,710). This rejection is respectfully traversed.

The present invention pertains to a portable self-contained electric power tool assembly that is illustrated, by way of example, in Figure 1 of the application, which is reproduced below.

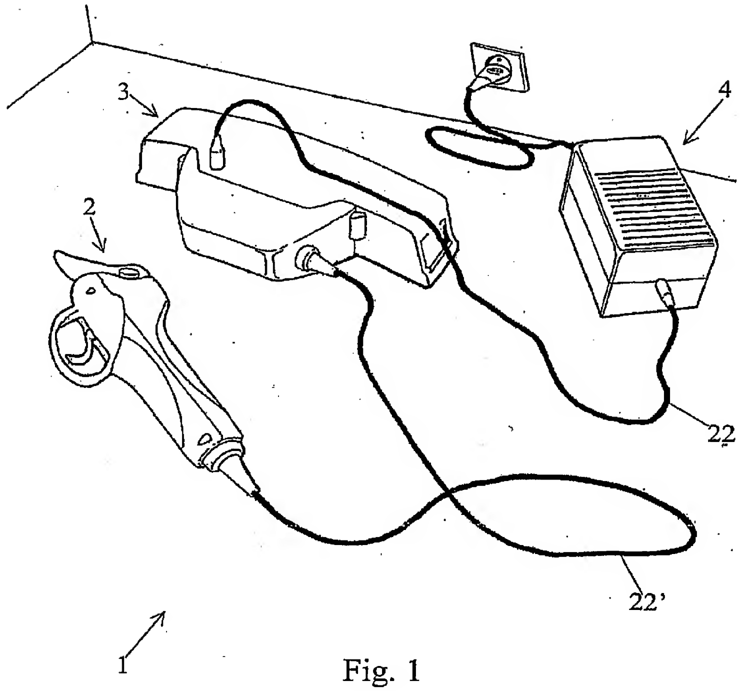

Fig. 1

Figure 1 shows a first subassembly forming an electrical actuator and generating the mechanical action of the tool; a second subassembly forming an electric energy source and comprising essentially a rechargeable electrochemical battery; and a third subassembly forming a charger adapted to carry out controlled recharging of the battery.

The second subassembly includes a control module (see Figures 3 and 4).

Claim 1 of the present invention recites:

the electrical command and control module (7) of the battery (5) fulfilling at least tasks i) to v) as follows:

i) management of charge,

ii) management of discharge,

iii) balancing the charge of each cell (6),

iv) protection in discharge of the battery (5) as to excess current during utilization of the tool,

v) management during storage, and

vi) management of diagnostics,

wherein when the tool assembly is not charging and has not been used for a predetermined period the digital processing unit (9) automatically performs a task of management of storage which comprises verifying whether the residual capacity of the battery (5) is greater or not than the storage capacity predetermined by the manufacturer or lithium ion or lithium polymer elements and, if the residual capacity is substantially superior to the storage capacity, in triggering by the digital processing unit (9) an automatic discharge of the battery.

PFEIFER et al. pertain to a portable electric power system to supply DC voltage. The Official Action refers to Figures 1 and 3 of PFEIFER et al, which are reproduced below.

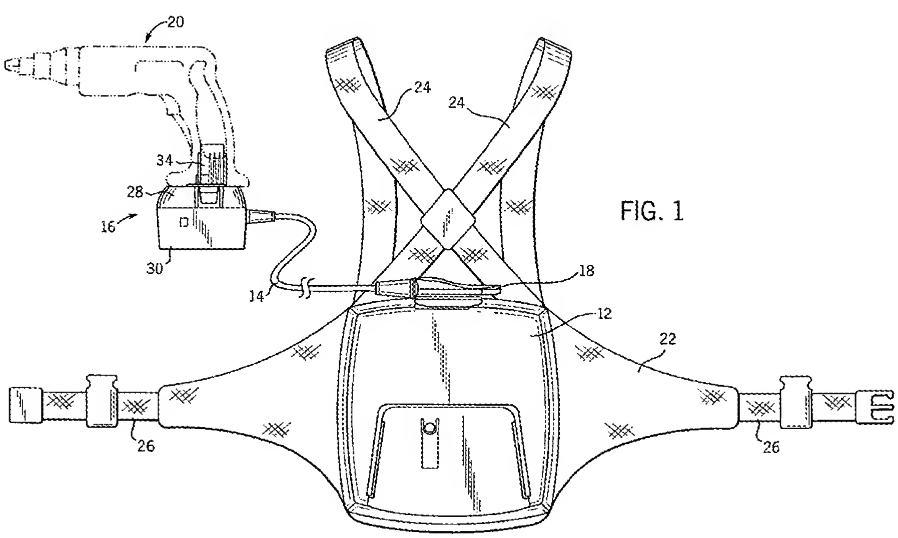

FIG. 1

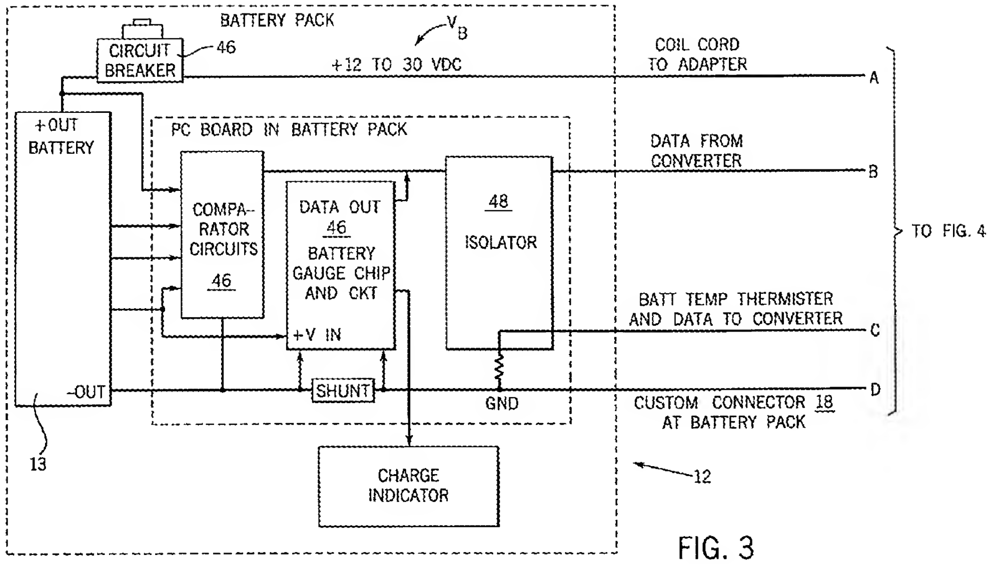

FIG. 3

As can be seen, PFEIFER et al. describe a portable electric power system with the three following subassemblies: (1) an electrical actuator (2) a portable energy source and (3) a charger.

KOGA describes a battery monitor apparatus, which, according to the Official Action, if inserted in the system described by PFEIFER et al., would obviously lead to the invention described in the application.

However, KOGA fails to teach at least one important feature of the invention as now expressly mentioned in claim 1: the management during storage.

In regards to this feature, the present invention sets forth inventive ways for avoiding damages due to long term storage out of the optimal cell storage capacity as defined by the cell manufacturer.

As now set forth in instant claim 1 of the present invention, and more detailed in paragraph [0066] of the specification, the present invention proposes to discharge a cell if its capacity is higher than the prescribed value, or to indicate to the user by a visual or sonic signal the necessity to plug the charger if at least one cell capacity is lower than the described value.

In addition, and as succinctly described in the text of the specification [0066], the storage management is based on the following logic:

(1) if a storage condition has been detected (not charging and not been used for a given period of time);

(2) and if the measured capacity of the battery is greater than the storage capacity predetermined by the manufacturer, then triggering a discharge of the battery thanks to resistive circuits, further stopping the electronic circuits and placing the processing unit in a standby mode; and/or

(3) if the measured capacity of the battery is less than the storage capacity predetermined by the manufacturer, triggering a sonic/visual alarm.

None of the two cited documents are concerned with storage or teach (1) the definition of a storage condition, (2) a logic for managing battery capacity during storage, (3) the use of resistive circuits to discharge the battery array, and (4) a standby mode for the processing unit.

KOGA only mentions the possibility to discharge selectively any cell of the array, but fails to teach at which condition such discharge is supposed to be achieved. KOGA is not concerned with the long term battery storage.

Hence, introducing the battery management system proposed by KOGA in the portable electrical system proposed by PFEIFER et al. could not have led the person skilled in the art to the invention as now set forth in claim 1, as none of these documents teach how to avoid damages due to long term storage.

Furthermore, the automatic execution of tasks i) to vi) under the control of the electronic command and control module set allows to use the lithium ion battery in an optimal way, to uphold its performances, to extend its lifetime and to ensure a follow up to its state during its lifetime.

Now deficiencies of the applied art of PFEIFER et al. and KOGA in regards to the dependent claims will be discussed.

Regarding claim 2: The present invention also proposes to integrate a memory in the digital processing unit. This memory component is used to store diagnostic data, as mentioned in claim 21. This component is mentioned neither in KOGA nor in PFEIFER et al.

Regarding claim 6: The references do not mention resistive elements, such as those set forth for the present invention. Both KOGA and PFEIFER et al. fail to teach the use of resistive input elements so as to obtain very low loss currents.

None of these document attempt to reduce the loss current under the 1/20000.sup.th per hour of the total capacity of the battery.

Regarding claim 7: The references do not mention the voltage precision, such as set forth in the present invention. Furthermore, none of the documents teach to reduce the voltage precision to 50 mV.

Regarding claim 8: The references do not mention the calibration, such as set forth in the present invention. However, KOGA describes the calibration as a frequent operation although, as mentioned in claim 8, the invention proposes a single calibration to be achieved during the electronic card production. See KOGA Fig. 6, Col. 16, l. 36-42, Col. 17, l. 6-16.

Regarding claim 9: The references do not mention the calibration programming, such as set forth in the present invention.

Regarding claim 10: The references do not mention the use of dissipater circuits, such as set forth in the present invention. In contrast, as detailed in [0058] of the application, the present invention achieves the cell balancing by the use of dissipater circuits. A cell is to be connected to its dissipater circuit if, during the charging phase, the charge level gets too high in comparison with the rest of the cells. Connecting the dissipater circuit reduces the charging current, thereby allowing the least charged cell to reach the most charged cell level. The cell is permanently in contact with the charger.

KOGA proposes to connect or disconnect the cell to the charging circuit, for example when the full charge is reached. See KOGA Col. 8, l. 61-64, Col. 9, l. 6-10.

Regarding claim 13: The references do not mention the overcharge prevention, such as set forth in the present invention. None of the two documents teaches to stop charging based on a detected current drop, an excessive temperature or an abnormal charging time.

For example, KOGA (1) does not exploit current such a way (see comments regarding claim 12), (2) does not mention temperatures, and (3) uses time only to synchronize measurements.

PFEIFER (1) does not mention current, (2) only measures temperature but don't interpret its value, and (3) does not mention charging time. See KOGA Col. 14, l. 38-41. See PFEIFER et al. Fig. 4.

Regarding claim 15: The references do not mention over current protection, such as set forth in the present invention. None of the two documents teach that over current can be avoided by cutting the discharge current in the case of high impulsional current (KOGA proposes to detect the flowing current, but fail to explain how to interpret this information to cut the discharge; PFEIFER et al. do not describe any battery protection system), high temperature (KOGA does not mention temperature and PFEIFER et al. only propose to use a temperature sensor to monitor and further display the operating temperature) or consumed energy

(neither KOGA nor PFEIFER et al. mentioned monitoring the consumed energy). See KOGA Col. 4, l. 51-55. See PFEIFER et al. Col. 5, l. 8-14.

Regarding claim 16: The references do not mention discharge current limitation, such as set forth in the present invention. None of the two documents teach the use of a modulation of impulse width (MLI). PFEIFER et al. propose the use of a MOSFET type switch as such switches have a relatively low conductive resistance. However, PFEIFER et al. propose to use it in the DC/DC converter although the invention uses such a switch for the discharge current limitation. See PFEIFER et al. Col. 4, l. 64-67.

Regarding claim 18: The references do not mention the detection of charger connection, such as set forth in the present invention. KOGA does not mention at all the detection of the charger. PFEIFER et al. describe a detection of the load with micro-switches activated by cammed regions. However, the function of these micro-switches and cammed regions is to indicate the voltage of the plugged tool. Therefore, neither KOGA nor PFEIFER et al. are concerned with the detection of the charger. See PFEIFER et al. Col. 4, l. 44-53.

Regarding claim 19: The references do not mention the automatic charging of the battery pack, such as set forth in the present invention.

The present invention automatically charges the battery if (1) the tool is stored in non-use phase (2) the charger is plugged (3) one cell reaches the minimum voltage advised by the manufacturer. Specification at paragraph [0068]. As already explained for claim 1, none of the two documents teach the storage management. Hence, none of the two documents can mention this automatic battery charge during storage.

Regarding claim 20: The references do not mention controlling the charger voltage, such as set forth in the present invention. The invention proposes (see paragraph [0069]) to monitor the voltage of the charger connection terminal and to stop charging if the voltage is out of a certain predefined range (more or less than a certain value).

Both of the two documents fail to teach checking the voltage of the charger and protecting the battery by stopping the charge as soon as the voltage is out of the range.

Regarding claim 21: The references do not mention the information and diagnostics management, such as set forth in the present invention. Neither KOGA nor PFEIFER et al. proposes to store and further transmit system information. One of the possibilities listed by Koga is to detect the state of each cell separately and to further display the value on a voltage monitor screen. However, the invention differs from Koga as (1) different information is taken into account (number of recharges, total of the hours of use of the tool, development of capacity of the

battery with time and mean energy consumed) (2) the information is stored and not simply displayed (3) the information can be transmitted to an external system. See Koga Col. 16, l. 50-58.

Regarding claim 22: The references cited by the examiner do not mention the association of components, such as set forth in the present invention.

Regarding claims 23 and 24: The references cited by the examiner do not mention redundant security circuits, such as set forth in the present invention. The security circuits according to the invention are installed in parallel to the normal control system (see paragraphs [0075] to [0077]). One of them aims at stopping potentially damaging charge (based on voltage) and the other aims at stopping potentially damaging discharge (based on the current). Both of them act under extreme conditions and do not disturb the digital processing unit.

None of the two documents teach the use of such circuits. The switch change-over circuit described by Koga is entirely controlled by the change over switch control circuit. The switches to protect over-charge and over-discharge are both fully controlled by the over-charge or over-discharge detection circuit. There is no redundant switch. See Koga Col. 12, l. 54-60.

Regarding claim 25: The references cited by the examiner do not mention the precision of current, such as set

forth in the present invention. None of the two documents teach which precision should be used.

As has been shown, one of ordinary skill and creativity would not produce a claimed embodiment of the present invention from a knowledge of PFEIFER et al. and KOGA. A prima facie case of unpatentability has thus not been made.

This rejection is believed to be overcome, and withdrawal thereof is respectfully requested.

CONCLUSION

The Examiner is thanked for considering the Information Disclosure Statement filed May 19, 2006 and for making an initialed PTO-1449 Form of record in the application.

Prior art of record but not utilized is believed to be non-pertinent to the instant claims.

The rejection of record is believed to have been overcome, obviated or rendered moot and that no issues remain. The Examiner is accordingly respectfully requested to place the application in condition for allowance and to issue a Notice of Allowability.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON

/Robert E. Goozner/

Robert E. Goozner, Reg. No. 42,593
Customer No. 00466
209 Madison Street, Suite 500
Alexandria, VA 22314
Telephone (703) 521-2297
Telefax (703) 685-0573
(703) 979-4709

REG/jr